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MONITORING OF MEDITERRANEAN COASTAL AREAS: PROBLEMS AND MEASUREMENT TECHNIQUES

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ABSTRACTS PRESENTATION

TITLE: **SPATIAL DISTRIBUTION AND COMMUNITY STRUCTURE OF MEGABENTHIC BIVALVES IN THE SUBTIDAL AREA OF THE GULF OF CÁDIZ (SW SPAIN)**

SESSION: Flora and Fauna of the littoral system: dynamics and protection

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ABSTRACT (MIN 3000 MAX 5000 CHARACTERS):

The Gulf of Cadiz (GoC) is an exploited ecosystem of the Iberian Peninsula characterized by high marine biodiversity and productivity. Amongst the bottom fishing activities conducted in the GoC the hydraulic dredging targets the clam *Chamelea gallina*, which has a high socioeconomic importance in subtidal soft bottoms. Thus, knowledge about the bivalve assemblages and distribution associated to natural beds of the striped clam *C. gallina* claim to be necessary in order to improve the sustainable and efficient management of this fishery resource. Previous studies of bivalves in the subtidal area of the GoC have been focused on soft bottoms from Bay of Cádiz (1), annual reports about the fishing grounds of *C. Gallina* (2), including discard and by-catch of the fishery (3), but scarce studies addressing diversity and spatial distribution.

The objective of this study was to analyse spatial diversity and species distribution of bivalve (> 2 mm) communities off the Spanish coast of the GoC and to relate the observed patterns to depth, sediment, water (temperature, salinity) characteristics, proximity of river outflows and wastewater treatment plants (regional scale). A sampling survey was conducted (ACUVEN-3, May-June 2019) using a commercial hydraulic dredge and following a systematic scheme where stations were located every 1 nautical mile and covering 3 depth strata [3-6m] [7-9m] [9-12m] from the mouth of the Guadiana River to the mouth of the Guadalquivir River including the Marine Protected Area of Doñana. In every station the dredge was deployed and towed parallel to the coast during 5 minutes and each transect was also geo-referenced by means of a GPS (GPSMAP 64s) in order to calculate the sampled area (m^2). The resuspended bottom material (sand and organisms) retained in the dredge was poured into a hopper. 5 l. samples were randomly collected from the hopper and sent to the laboratory to be examined and sorted. All organisms were taxonomically identified, counted and weighed. Density and diversity (produced with multivariate universal kriging) and species distribution (based on presence and absence) maps were performed. Five geographic zones were defined according to influence of River influence and wastewater treatment plants: GUAD (Guadiana River), PIED (Piedras River), ODI (Tinto and Odiel Rivers), EMAT (EDAR and Matalascañas) and GUAQ (Guadalquivir River).

A total of 49,624 megabenthic bivalves from 112 samples were identified alive belonging to 42 species and 18 families. The most dominant species in terms of density (ind m^{-2}) was *Chamelea gallina* (59.5%) followed by *Spisula solida* (13.3%). Total densities of bivalves reached higher values between the depth ranges of 7-8 m surrounding Tinto and Guadalquivir Rivers mainly due to the high dominance of *C. gallina* (Fig.1A)

The most frequent species were *C. gallina* (97%), followed by *Mactra stultorum* (72%). Of the total identified

species, 26 occurred less than 10% and thus were considered very rare in the area. The maps of species distribution based on presence and absence illustrated/revealed differences between species. The bivalves *C. gallina*, M. *stultorum*, *Pandora inaequivalvis*, *Corbula gibba*, *Spisula subtruncata*, *Donax semistriatus* and *Dosinia lupinus* showed wide spread distribution. On the other hand, there were species only found in the GUAD and GUAQ zones, respectively. Diversity and evenness analysis revealed significant differences among zones, mainly observed between western (GUAD and PIED) and eastern (EMAT and TODI) zones. The maps indicated greater diversity around the Guadiana and Piedras Rivers outflows showing a clear decrease in bivalve diversity from western to eastern where the EMAT zone exhibit the lowest diversity (Fig. 1B-C). Overall, the EMAT zone showed lower diversity and lower evenness (i.e. assemblages dominated by few species) (Fig.1D). On the other hand, GUAQ zone displayed in general low diversity and high evenness in the deeper areas but no clear trend was observed in the other zones. The analyses of bivalve assemblages also revealed significant differences between zones with an average dissimilarity of 60.27 %. Despite these differences, twelve species were shared between the four zones.

Results of this set of analyses enhanced the knowledge of diversity and spatial distribution of bivalves in the subtidal area of the GoC. Additionally, River outflows or marine reserve effect seemed to play a notable role in their settlement and the location of density spots. This information should be taken into consideration in commercial marine resources management's strategy.

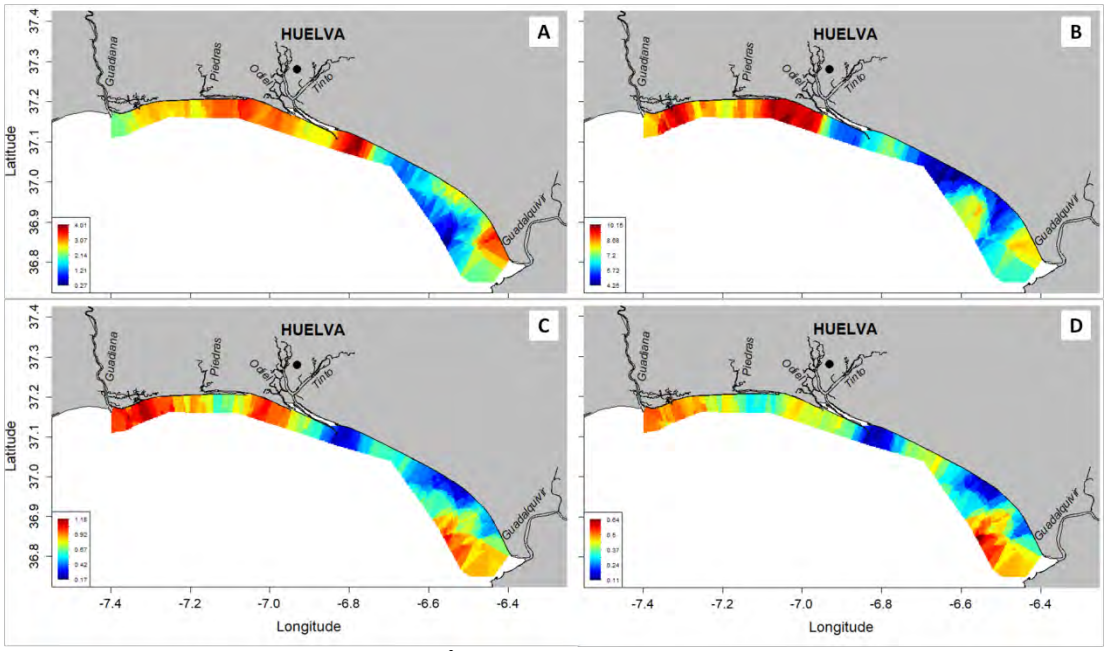

Figure 1. Kriged maps for density (ind m-^{2}) (A), species richness (B), Shanon index (C) and evenness (D).

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